

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY


(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference P06323PC00		FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/EP2004/011106		International filing date (day/month/year) 05.10.2004	Priority date (day/month/year) 06.10.2003	
International Patent Classification (IPC) or national classification and IPC H04L12/56				
Applicant TELEFONAKTIEBOLAGET LM ERICSSON (PUBL) et al				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 3 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 08.07.2005		Date of completion of this report 31.08.2005		
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**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/011106

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-21 as originally filed

Claims, Numbers

1-9 received on 12.07.2005 with letter of 08.07.2005

Drawings, Sheets

1/12-12/12 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/011106

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-6
	No: Claims	7-9
Inventive step (IS)	Yes: Claims	1-6
	No: Claims	7-9
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Following document is referenced to:

D1: EP-A-0 912 016 (LUCENT TECHNOLOGIES INC) 28 April 1999 (1999-04-28)

A. Citations and explanations with respect to Item V

Part I: Claims 1-6

- 1.1 The present invention is defined by a method for regulating the flow of data (claim 1) between (a)-"a first transmitting radio network node and a second transmitting radio network node" such that (a)(1)-"the second transmitting radio network node is receiving data from the first transmitting radio network node and transmits these data to user terminals" wherein (b)-"the first transmitting radio network node sends a capacity request to the second transmitting radio network node requesting permission to send an indicated number of data units", (c)-"the second transmitting radio network node responds by sending an allocation frame indicating the number of allowed data units" such that (d)-"in case that the buffer resources at the second transmitting radio network node are scarce the second transmitting radio network node further performs the steps of" (d)(1)-"counting the number of requested data units", (d)(2)-"computing the number of of data units to be communicated to the first transmitting radio network node by subtracting from a target buffer filling level the number of data units currently stored in the buffer and the number of data units previously communicated to the first transmitting radio network node but not yet received", (d)(3)-"inserting the number computed in (d)(2) in an allocation frame for transmission to the first transmitting radio network node in response to the capacity request".
- 1.2 The closest prior art is given by EP-A-0912016 (D1) which discloses a method for regulating the flow of data between wireless subscribers and a base station such that the subscribers are sending bandwidth reservation requests to the base station, the base station is computing the bandwidth distribution considering all requests and is then informing each subscriber which bandwidth is finally allocated. The bandwidth allocation is based on several buffer occupancy thresholds which are set in advance by the network provider.

- 1.3 The difference between the subject matter of claim 1 and the disclosure of D1 is given by the features (a)(1) and (d)(2). The novelty (Art 33(2) PCT) of the subject matter of claim 1 follows then a fortiori.
- 1.4 The objective problem (P) to be solved by the present invention is the (P)-
"achievement of an optimised method for flow control based on buffering between two transmitting units located in a radio access network, one of the units transmitting data to a mobile subscriber, under consideration of the spatial buffering location and without involvement of any mobile subscriber."
- 1.5 (P) is solved by the complementation of features (a) by (a)(1) and (d), (d)(1) and (d)(3) by (d)(2) since this complementation leads to a functionality which then allows the selection of the spatial buffering location by deciding which amount of data is stored in the first and which in the second transmitting radio network node without any involvement of any mobile subscriber, hence solving (P). Since no unique solution to (P) exists and since the solution of (P) defined in the subject matter of claim 1 is not directly, uniquely and completely derivable by the prior art given by D1 the inventive step (Art 33(3) PCT) of the subject matter of claim 1 follows a fortiori.
2. It is considered appropriate, for technical reasons, to discuss claim 6 before claim 4. The subject matter of claim 6 differs from the subject matter of claim 1 by the feature: (α)-"The feature (c) of claim 1 is based on a selection which is proportional to the radio channel qualities indicated by the user entities". Since feature (α) is not disclosed by D1, the subject matter of claim 6 is novel (Art 33(2) PCT). Since feature (α) implies features (d) and (d)(1)-(d)(3) (which are not explicitly present in claim 6, contravening Art 6 PCT), since feature (α) does not lead to a reformulation of the objective problem (P) and since feature (α) offers an alternative solution to (P) which is unitary with the solution of claim 1, the subject matter of claim 6 involves an inventive step (Art 33(3) PCT) for the same reasons as already discussed with respect to claim 1.
3. The subject matter of claim 6 is included in the subject matter of claim 4. As a consequence thereof the subject matter of claim 4 defines a dependent claim, being dependent on claim 6; this is, however, not apparent at first sight, since claim 4 is

formulated using the wording of an independent claim with no reference to claim 6 (thus contravening Art 6 PCT). Since claim 4 is defining a dependent claim being dependent on a claim which is novel (Art 33(2) PCT) and involving an inventive step (Art 33(3) PCT), the subject matter of claim 4 is a fortiori novel (Art 33(2) PCT) and is a fortiori involving an inventive step (Art 33(3) PCT).

4. Dependent claims 2, 3 and 5 are then a fortiori novel (Art 33(2) PCT) and are a fortiori involving an inventive step (Art 33(3) PCT).
5. The technical processes defined in claims 1-6 can be realised by commercially available resources for the processing, transmission and storage of information; their subject matter is therefore susceptible of industrial application (Art 33(4) PCT).

Part II: Claims 7-9

1. Document D1 which is considered to represent the closest prior art discloses according to all features of claim 7 a radio network node for regulating the flow of data from a transmitting node (see D1, page 2, paragraph 1; page 9, paragraph 45), comprising a buffering resource (see D1, page 29, paragraph 147), a capacity allocation device for allocating individual amounts of user data to individual user entities (see D1, page 3, paragraph 9), a flow control protocol and a scheduler (see D1, page 9, paragraph 45) such that the capacity allocation device comprises a counter for keeping a running count of the instantaneous number of outstanding credits, outstanding credits being defined as the number of data units that the allocation device has permitted the transmitted node to send, although the corresponding number of data units has not yet arrived at the radio network node (see D1, page 26, paragraph 126).

Therefore the subject matter of claim 7 is not new (Art 33(2) PCT), and, a fortiori, not inventive (Art 33(3) PCT).

2. Dependent claims 8-9 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, are novel for the reason that the subject matter of said claims is disclosed in document D1 (see in

particular figures 7 and 12; page 2, paragraph 1, page 3, paragraph 9; page 5, paragraphs 23-24; page 7, paragraphs 29-30; page 8, paragraphs 37-38; page 9, paragraphs 39-40 and 45; page 20, paragraphs 110-111; page 26, paragraph 126; page 28, paragraph 145; page 29, paragraph 147).

Therefore, the subject matter of dependent claims 8-9 is not new (Art 33(2) PCT), and, a fortiori, not inventive (Art 33(3) PCT).

3. The technical apparatuses defined in claims 7-9 can be realised by commercially available resources for the processing, transmission and storage of information; their subject matter is therefore susceptible of industrial application (Art 33(4) PCT).

B. Explanations with respect to Item VII

1. Although claims 1, 4, and 6 have been drafted as separate independent claims, they appear to relate effectively to the same subject matter and to differ from each other only with regard to the definition of the subject matter for which protection is sought or in respect of the terminology used for the features of that subject matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Art 6 PCT.

2. The applicant's attention is drawn to the following matters, which should as well have been considered:

- 2.1 To meet the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in document D1 should have been acknowledged in the description.

CLAIMS

1. A per flow used control method for regulating the flow of data between a first transmitting radio network node (4) and a second transmitting radio network node (6) in a radio transmission network, said second transmitting radio network node (6) receiving data from said first transmitting radio network node (4) to be forwarded to plural user entities (7) via an air interface, wherein
- the first transmitting radio network node (4) sends a capacity request (10) to the second transmitting radio network node (6) requesting the second transmitting radio network node (6) for permission to send an indicated number of data units that are pending in the first transmitting radio network node (4), and
 - the second transmitting radio network node (6), in response to the capacity request, sends an allocation frame (11) to the first transmitting radio network node (6), said allocation frame indicating the number of data units the first transmitting radio network node (4) is given permission to transmit, this latter number being referred to as credits;
- characterized by** the second transmitting radio network node (6) performing the following steps for a data flow (12) between the first and second transmitting radio network node in case buffer resources (9) for storing of data units at the second transmitting radio network node (6) are scarce:
- counting the instantaneous number of requested data units;
 - computing the number of credits to be granted by subtracting from a target buffer filling level the number of data units currently stored in the buffer and the number of credits previously given but not yet received, these credits below referred to as outstanding credits;
 - inserting the number of granted credits so computed in an allocation frame (10) for transmission to the transmitting node in response to the capacity request.
2. The per flow used control method in accordance with claim 1, **characterized by** comparing the number of data units currently stored in the buffer with the number of requested data units, selecting the smaller one of these numbers as a potential number of granted credits from which the number of outstanding credits is subtracted in order to obtain the number of granted credits.
3. The per flow used control method in accordance with claim 2, **characterized by** the receiving node keeping a running count of the number of outstanding credits, this being achieved

- by increasing the count each time an allocation frame is sent, said count being increased with the number of granted credits indicated in the allocation frames, and
 - decreasing said count each time data units are received, said count being decreased with the number of received data units.
- 5 4. A per node used control method for regulating the flow of data between a first transmitting radio network node (4) and a second transmitting radio network node (6) in a radio transmission network, said second transmitting radio network node (6) receiving data from said first transmitting radio network node (4) to be forwarded to plural user entities (7) via an air interface, wherein
- 10 -the first transmitting radio network node (4) sends a capacity request (10) to the second transmitting radio network node (6) requesting the second transmitting radio network node (6) for permission to send an indicated number of data units that are pending in the first transmitting radio network node (4), and
- the second transmitting radio network node (6) in response to the capacity request sends an
- 15 allocation frame (11) to the first transmitting radio network node (4), said allocation frame indicating the number of data units the first transmitting radio network node (4) is given permission to transmit, this latter number being referred to as credits;
- characterized by** the second transmitting radio network node (6) performing the following steps for each data flow (12) between the first and second transmitting radio network nodes in
- 20 case buffer resources (9) for storing of data units at the second transmitting radio network node (6) are scarce:
- counting the instantaneous number of requested data units in each data flow to obtain a total number of requested data units;
 - computing the total number of credits to be granted in each data flow by subtracting from a
- 25 target buffer filling level for the total number of data flows the total number of data units currently stored in each of the buffers and the total number of credits previously given but not yet received; and
- distributing the total amount of credits of the receiving node proportionally to the radio channel qualities (28) indicated by the respective user entities (7).
- 30 5. The per flow used control method in accordance with claim 4, **characterized by** limiting the total sum of user data in all data streams to a desired value less than or equal to the total requested number of data units.

6. A per node used control method for regulating the flow of data between a first transmitting radio network node (4) and a second transmitting radio network node (6) in a radio transmission network, said second transmitting radio network node (6) receiving data from said first transmitting radio network node (4) to be forwarded to plural user entities (7) via an air interface, wherein

-the first transmitting radio network node (4) sends a capacity request (10) to the second transmitting radio network node (6) requesting the second transmitting radio network node (6) for permission to send an indicated number of data units that are pending in the first transmitting radio network node (4), and

-the second transmitting radio network node (6) in response to the capacity request sends an allocation frame (11) to the first transmitting radio network node (4), said allocation frame indicating the number of data units the first transmitting radio network node (4) is given permission to transmit, this latter number being referred to as credits,

characterized by distributing the number of credits given by the second transmitting radio network node (6) proportionally to the radio channel qualities (28) indicated by the respective user entities (7) to which the second transmitting radio network node (6) is scheduling radio transmission of data units.

7. A radio network node (6) for regulating the flow of data from a transmitting node (4), comprising a buffering resource (9), a capacity allocation device (23) for allocating individual amounts of user data to individual user entities (7), a flow control protocol and a scheduler (16), **characterized in that** the capacity allocation device (23) comprises a counter (29) for keeping a running count of the instantaneous number of outstanding credits, outstanding credits being defined as the number of data units that the allocation device has permitted the transmitting node (4) to send, although the corresponding number of data units has not yet arrived at the radio network node (6).

8. The radio network node (6) in accordance with claim 7, **characterized in that** the capacity allocation device comprises a counter for keeping a running count of user data pending in the transmitting node (4).

9. The radio network node (6) in accordance with claim 7 or 8, **characterized by** a distribution device adapted to distribute the total number of credits given by the radio network node (6) proportionally to the radio channel qualities (28) indicated by the respective user entities (7) to which the scheduler (16) is scheduling radio transmission of data units.